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THE NYMPHS OF THE CANADIAN SPECIES OF OPHIOGOMPHUS *ODONATA, GOMPHIDAE*

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Although the species of *Ophiogomphus* are well defined in the adult stage their nymphs are extremely uniform in structure and are difficult to separate. This is perhaps not remarkable in view of the similarity of their habitats, all the species being shallow burrowers in running streams, usually clear, with a sandy or pebbly bottom, where they occupy the edges of currents, gentle riffles, or pools at the foot of rapids.

The nymphs of most of the North American species have been described but, with the exception of Kennedy's excellent treatment of the western species (Kennedy, '17), the published descriptions are inadequate for the recognition of the species with any degree of certainty, and no key for their separation has been hitherto attempted. The characters generally used in separating nymphs of other gomphines, such as the labial teeth, dorsal hooks, lateral spines, and relative portions of abdominal segments are all remarkably uniform and, at the same time, variable within the range of each species, and are therefore not sufficient in themselves for diagnostic purposes. Some of these characters, such as the number of labial teeth (including those of both middle and lateral lobes) are so variable as to be almost useless. The antennae and anal appendages offer useful characters, but in some cases very accurate measurements must be made in order to define the differences between species. Few characters are absolutely constant; all should be taken into consideration.

The nymphs of three of the eastern species of *Ophiogomphus* have been hitherto unknown, viz., *O. anomalus, carolinus* and *howei*. That of *anomalus* is described below and, with its discovery, all the Canadian species are now known in the last nymphal stage. By including our two western species *severus* and *occidentis* (*phaleratus*) the scope of this paper has been widened so as to cover all of the Canadian species and, at the same time, to characterize all of the eastern species whose nymphs are not known.

The writer is greatly indebted to Professor J. G. Needham for the loan of the material in the Cornell University collection, to Messrs. Paul Hahn, E. B. S. Logier and F. P. Ide, Dr. W. A. Clemens and Professors C. H. Kennedy and W. J. K. Harkness for the gift of a large proportion of the remaining material studied.

In the key and descriptions which follow I have deemed it advisable to employ the proper morphological terms for the anal appendages, instead of those commonly used by odonatists. Thus, the median or superior appendage is the epiproct (supra-anal plate), the inferior appendages are the paraprocts (subanal or podical plates) and the lateral appendages are the cerci. The term cercoids for these appendages is no longer admissible.

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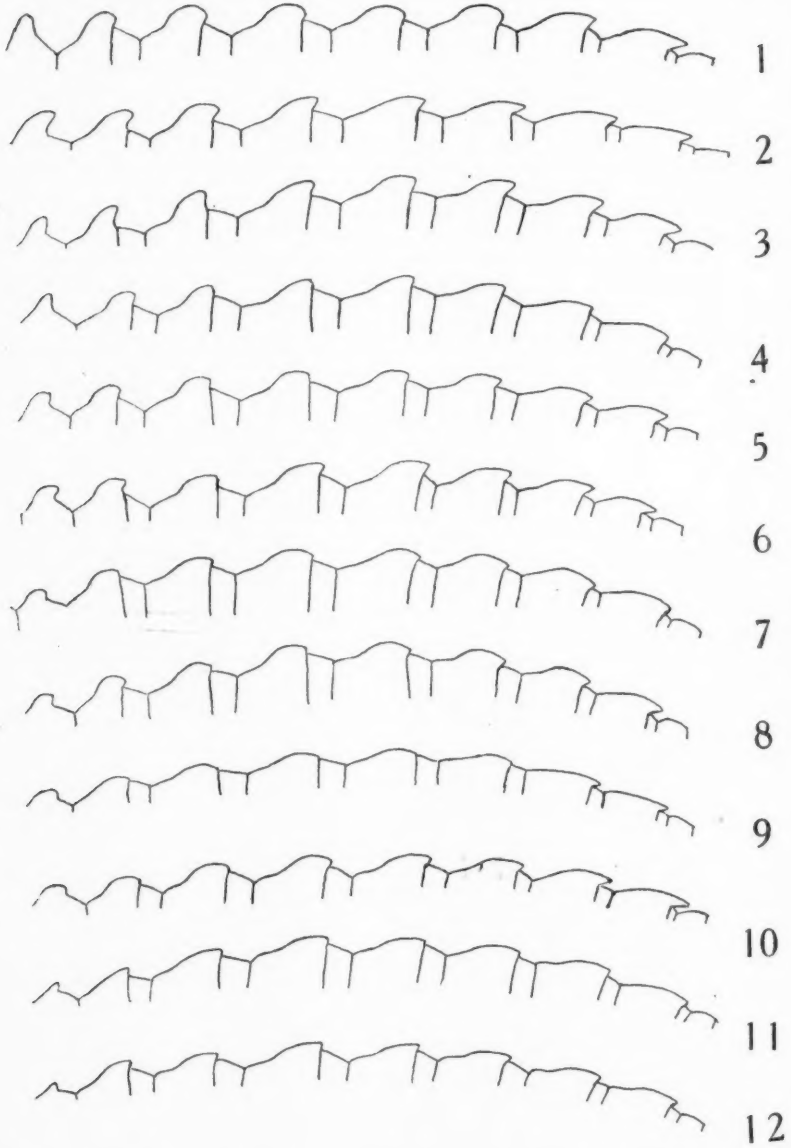


Profile of mid-dorsal line of abdomen of *Ophiogomphus* nymphs, showing dorsal prominences; viewed from left side. Fig. 1, *O. occidentis;* 2, *severus;* 3, *colubrinus;* 4, *aspersus;* 5, *mainensis* (Johnstown, N. Y.); 6, *mainensis* (Elk Gardens, W. Va.), 7, *rupinsulensis* (Credit River, Ont.); 8, *rupinsulensis* (Pustagone River, Ont.); 9, *carolus* (Horning's Mills, Ont.); 10, *carolus* (near Sussex N. B.); 11, *anomalus* (Gull River, Ont.); 12, *anomalus* (Gull River, Ont.).

KEY TO NYMPHS

1 Lateral spines on abd. segs. 7-9 only 2

1′ Lateral spines on abd. segs. 6-9. Cerci two-thirds as long as epiproct; cerci and epiproct long and tapering; dorsal prominences heavy..*occidentis*

2 Fourth seg. of antennae minute, much narrower than third, from which it is sharply delimited; third seg. more or less narrowed before the distal end (figs. 34-38) 3

2′ Fourth seg. of antennae as broad as distal end of third, from which it is not sharply delimited; third seg. not narrowed distally (fig. 33) .*anomalus*

3 Third seg. of antennae spatulate, 2.5 to 3 times as broad as long; apex of epiproct of male extending more than one-third of its length beyond the ante-apical tubercles*, which project scarcely, if at all, laterad of the sides of the epiproct (figs. 15-17, 19, 20)..... 4

*Apices of developing inferior appendage of adult.

3′ Third seg. of antennae sub-oval, twice as long as broad; apex of epiproct of male extending not more than one-third of its length beyond the ante-apical tubercles, which project laterad of the sides of the epiproct (fig. 18) .....*mainensis*

4 Length of cerci twice the median length of seg. 10, their basal width not less, usually slightly more than half the length of their dorsal margin, and less than twice their middle width; cuticular granules coarse, deeply pigmented (figs. 29-32); epiproct a little shorter than segs. 9-10 and shorter than the distance between the latero-basal angles of the cerci, as viewed from above 5

4′ Length of cerci 2.5 times the median length of seg. 10, their basal width less than half the length of the dorsal margin and more than twice their middle width; their distal half very slender and tapering; cuticular granules finer, often no darker than the surrounding area (figs. 22-26) 6

5 Third seg. of antennae 2.5 times as long as broad; cerci two-thirds as long as epiproct; dorsal knob on seg. 2 stout .....*carolus*

5′ Third seg. of antennae 3 times as long as broad; cerci nearly three-fourth as long as epiproct; dorsal knob of seg. 2 of moderate size ..... *rupinsulensis*

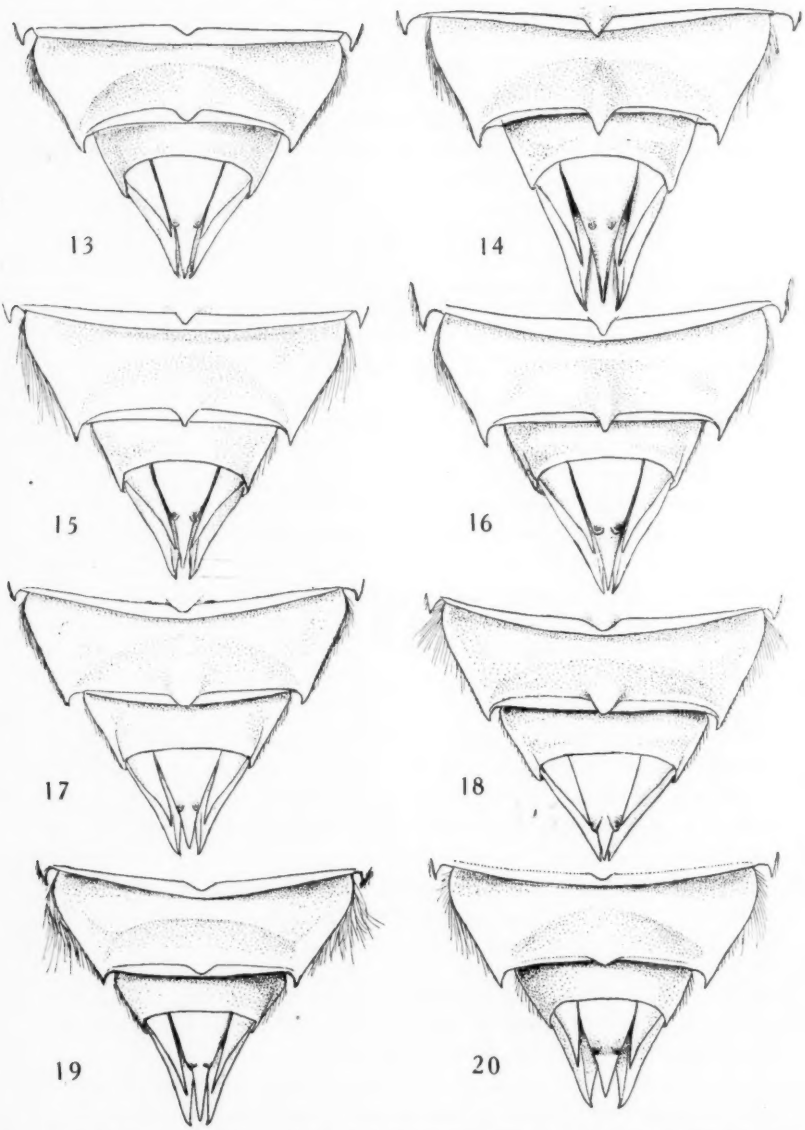
6 Cerci four-fifths as long as epiproct; dorsal knob on seg. 2 more or less recurved; greatest width of abdomen* about equal to combined lengths of segs. 7-10 and anal pyramid .....*severus*

*Measurements taken from exuviae.

6′ Cerci three-fourths as long as epiproct; dorsal knob on seg. 2 erect, not or scarcely recurved; greatest width of abdomen* a little less than combined length of segs. 7-10 and anal pyramid 7

7 Dorsal prominences on segs. 8 and 9 apically acutangulate or rectangulate as viewed from above; lateral spines of segs. 8 and 9 equal; sides of mentum of labium distally barely divergent or parallel .....*colubrinus*

7′ Dorsal prominences on segs. 8 and 9 apically obtusangulate as viewed from above; lateral spines of seg. 9 smaller than those of 8; sides of mentum of labium distally slightly convergent .....*aspersus*



Terminal abdominal segments and anal pyramid of male nymphs of *Ophiogomphus*. Fig. 13, *anomalus;* 14, *occidentis;* 15, *severus;* 16, *colubrinus;* 17, *rupinsulensis;* 18, *mainensis;* 19, *aspersus;* 20, *carolus*.

Ophiogomphus occidentis Hagen. At once distinguished from all other Canadian species of *Ophiogomphus* by the presence of lateral spines on abd. seg. 6. The lateral spines all stand out somewhat prominently from the lateral margins of the segments, those of segs. 6 and 7 being slightly divergent. The dorsal knobs are generally more massive than in the other species. On most of the segments they occupy the posterior three-fifths to three-fourths of the median length of the segment, on which they are rather abruptly elevated; they are well rounded antero-dorsally but usually somewhat excavate behind, so as to appear more or less recurved; on seg. 2, however, the knob tends to be slender, erect and hardly, it at all, recurved; on 8 and 9 they are fairly high and arcuate in profile, and their apices, viewed from above are acutangulate, or, on 8, sometimes slightly obtuse. Cerci tapering rapidly from base to middle, then more slowly, apices long and slender. Epiproct as long as segs. 9-10 or a little longer, the ante-apical tubercles in the male smaller and less prominent than in the other species. Antennae and labium similar to those of *severus*; median lobe of labium low with 19-25 teeth.

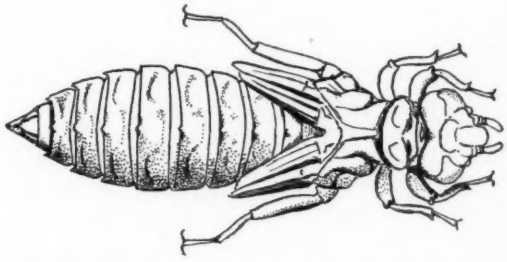
Measurements of three specimens (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Umatilla	27.0	16.0	7.5	4.75	5.0
Umatilla	27.0	17.0	7.75	5.0	5.5
Summerland	29.0	19.0	8.5	5.0	6.0

Localities: Summerland, B. C., 6 VII 1928, 1 exuv. (Logier); Umatilla, Ore., 9, 10 VII 1913, 4 exuv. (Kennedy); Coliseum, Calif., VI 1914 (*occidentis californicus;* Kennedy).

The nymph of *occidentis* was first described by Hagen ('05) and figured by Kennedy ('15). It was more fully characterized with new figures by Kennedy ('17).

Ophiogomphus anomalus Harvey. Differs from all the other species in the antennae, the fourth segment of which caps the entire end of the third segment and is inflated, so that, in profile view, it is seen to be much thicker than the third segment. Fig. 33 shows the dorsal surface and is sufficiently characteristic without further description. Labium when folded not quite reaching the hind



Nymph of Ophiogomphus anomalus Harvey.

margin of the prosternum; sides of mentum distally slightly convergent; median lobe regularly arcuate, bearing 17-23 teeth. Dorsal prominences of abdomen variable but always more or less low with small apices; that of seg. 2 small and conical, most

of the others gently convexly curved in profile, the apices of those on segs. 8 and 9, viewed from above, bluntly obtusangulate or rounded, especially on 8. Lateral spines on 7-9, about equally developed on all three segments, none divergent, their outer margins following the general outline of the abdomen. Epiproct barely as long as segs. 9-10, shorter than the distance between the latero-basal angles of the cerci, as viewed from above; about twice as long as its basal width, tapering evenly in the male, except just beyond the ante-apical tubercles, where it is more abruptly narrowed; in the female it is slightly acuminate apically. Cerci scarcely more than two-thirds the length of the epiproct, very little acuminate, their basal width about three-fifths of their length.

General colour ochraceous brown, nearly uniform on the head, thorax, legs and wing-pads, most of the abdominal segments each with a pair of small, submedian dark spots, a pair of larger, less distinct, dorso-lateral blotches, and sometimes vague lateral infuscations about the muscle scars. The cuticular granules are of average size, the legs fairly hairy, but the lateral margins of the abdomen, as judged from exuviae, less so than usual.

Measurements of three specimens (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Shawanaga River	23.5	14.5	6.0	3.8	4.5
Gull River	24.0	15.0	6.5	4.0	5.0
Gull River	25.0	16.5	6.5	4.5	5.0

Localities: Three-mile Rapid, Gull River, Lake Nipigon, Ont., 10 VI 1922, 15 exuviae, some with newly emerged adults (Logier); Shawanaga River, Parry Sound, Ont., 9 exuv. (Hahn).

Ophiogomphus mainensis Pack. Similar in size and proportions to *O. anomalus*, the general colour paler, the submedian and lateral rows of spots well marked, cuticular granules rather coarse. Easily distinguished from *anomalus* by the antennal characters and from all the others by the broad, obliquely oval form of the third antennal segment. Labium, when folded, reaching the posterior margin of the prosternum, broadest at the distal end, the median lobe occupying distinctly more than one-third of this breadth, evenly arched, bearing 22-32 teeth. Dorsal prominences of abdomen variable, larger than in *anomalus*, that of seg 2 a rather stout, rounded knob, as in *carolus*, but more prominent, that of 3 similar but longer, those on the remaining segments becoming larger and lower, but all distinctly arcuate in profile, the apices of the prominences on 7 and 8 obtuse or rounded, as viewed from above; that of 9 usually rectangulate, but bluntly rounded. Lateral spines on 7-9, of about equal size, rather small. Anal pyramid slightly shorter than segs. 9-10, the epiproct in the male suddenly narrowed at nearly three-fourths of its length, just beyond the ante-apical tubercles, which are more prominent than usual, though not always so marked as in the specimen figured (fig. 18). Cerci about three-fourths as long as epiproct, a little less than twice as long as their basal width, the sides nearly straight, the tip slightly bent but scarcely acuminate. Cuticular granules numerous, of moderate size.

Measurements of three exuviae (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Covey Hill	23.0	15.0	6.0	4.0	5.0
Wilmurt	24.0	15.5	7.5	4.0	5.0
Johnstown	24.0	16.0	6.75	4.0	5.0

Localities: Covey Hill, Que., 17 VII 1927, 1 exuv. (Walk.); Wilmurt, N. Y., adult and exuv. (type of *O. johannus* Needh., in Cornell Univ. coll.); Johnstown, N. Y., emerging adult with exuv. and 1 full-grown nymph (Cornell Univ. coll.); Stony River, W. Va., 7 nymphs, oldest in penult. stage (Cornell Univ. coll.); Elk Garden, Mineral Co., W. Va., 2 full grown nymphs, 2 antepenult. stage (Cornell Univ. coll.).

It is possible that the West Virginia specimens may belong to *O. carolinus*, but I cannot distinguish them from nymphs of *O. mainensis*, which has been taken as far south as western Pennsylvania.

The nymph of *mainensis* was described under the synonym *johannus* Needham by Woodruff ('14) but the figures are misleading and some of the characters given for the separation of this species from *carolus* and *aspersus* are unreliable.

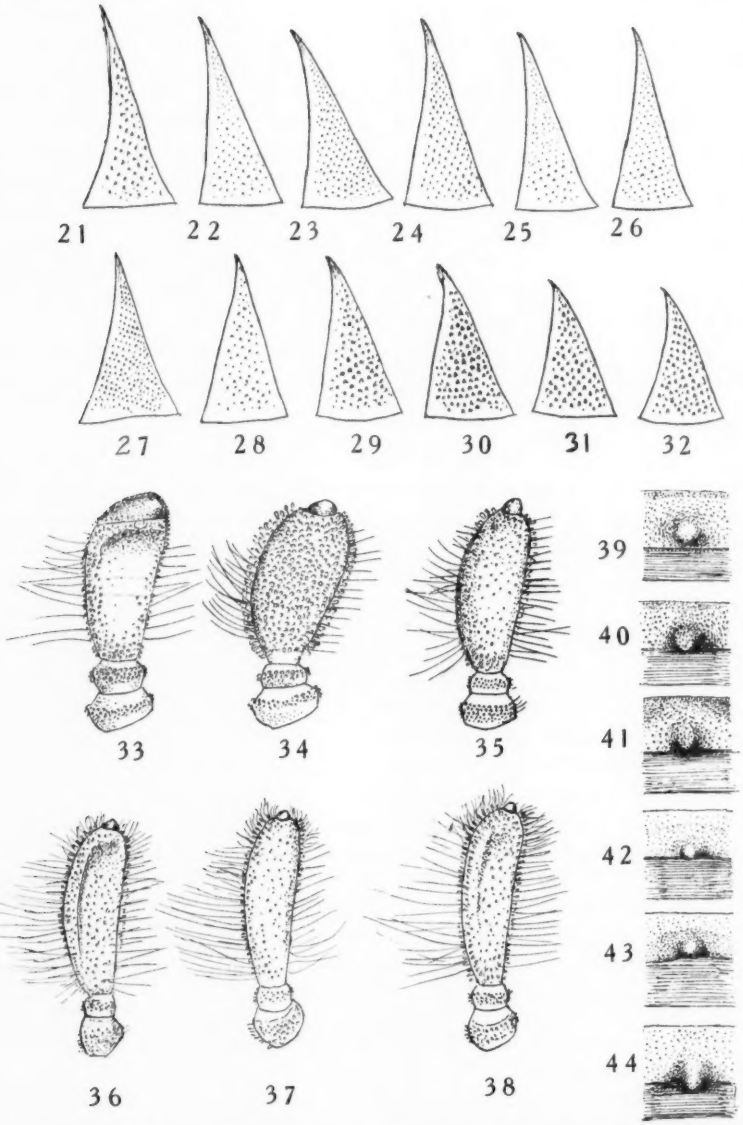
Ophiogomphus carolus Needham. Very similar in size and form to the last two species, darker and more uniform in colour than *O. mainensis*, the submedian and lateral rows of spots being faint or obsolete. Cuticular granules coarse, darkly pigmented. It is readily distinguished from *O. mainensis* by the narrower third segment of the antennae, which, however, is broader than in any species with a minute fourth segment. Labium, when closed, not quite attaining the posterior margin of the prosternum; median lobe of mentum evenly arched, its width greater than one-third that of the entire distal width of the mentum, the teeth numbering usually about 31 (29-32). Dorsal prominences of abdomen variable, usually very low on most of the segments, that of seg. 2 a rounded knob, stouter than usual, the others becoming successively lower until, on segs. 8 and 9, they are represented by scarcely more than the bluntly pointed apices, which appear obtusangulate when viewed from above. In profile these segments generally appear dorsally almost straight, but are sometimes slightly arcuate. Anal pyramid slightly shorter than segs. 9-10, and distinctly shorter than the distance between the latero-basal angles of the cerci; epiproct in male not suddenly narrowed beyond the ante-apical tubercles, which are smaller than in *O. mainensis*. Cerci about two-thirds as long as epiproct, their basal width about three-fifths their length, scarcely acuminate, their cuticular granules coarse.

Measurements of three exuviae (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Ithaca	23.0	15.0	7.0	4.5	4.6
Ithaca	25.5	15.5	7.5	4.4	5.0
Horning's Mills	26.0	16.0	7.0	4.1	5.0

Localities: Pine River, at Horning's Mills, Ont., 19 VI 1931, 3 exuv. (Ide); near Sussex, N. B., 13 VII 1932, 1 exuv. (Walk.); near Pictou, N. S., 14 VII 1932, 1 exuv. (Walk.); Godbout, Que., 25 VII 1918, 2 exuv. (Walk.); Ithaca, N. Y., 10 nymphs, 6 full grown, 4 juv. (Needham, Cornell Univ. coll.);

CAN. ENT. VOL. LXV. PLATE 13.



Figs. 21-32, right cercus of *Ophiogomphus* nymphs. Fig. 21, *occidentis;* 22, *severus;* 23, 24, *colubrinus;* 25, 26, *aspersus;* 27, *anomalus;* 28, *mainensis;* 29, 30, *rupinsulensis;* 31, 32. *carolus.* Figs. 33-38, left antenna: 33, *anomalus;* 34, *mainensis;* 35, *carolus;* 36, *rupinsulensis;* 37, *aspersus;* 38, *colubrinus.* Figs. 39-44, dorsal prominence of abd. seg. 2, viewed from above; 39, *mainensis;* 40, *carolus;* 41, *rupinsulensis;* 42, *aspersus;* 43, *colubrinus;* 44, *severus.*

Buttermilk Creek, near Ithaca, N.Y., 24 V 1926, 1 full grown nymph (J. R. Greely, Cornell Univ. coll.)

The nymph was described by Needham ('01).

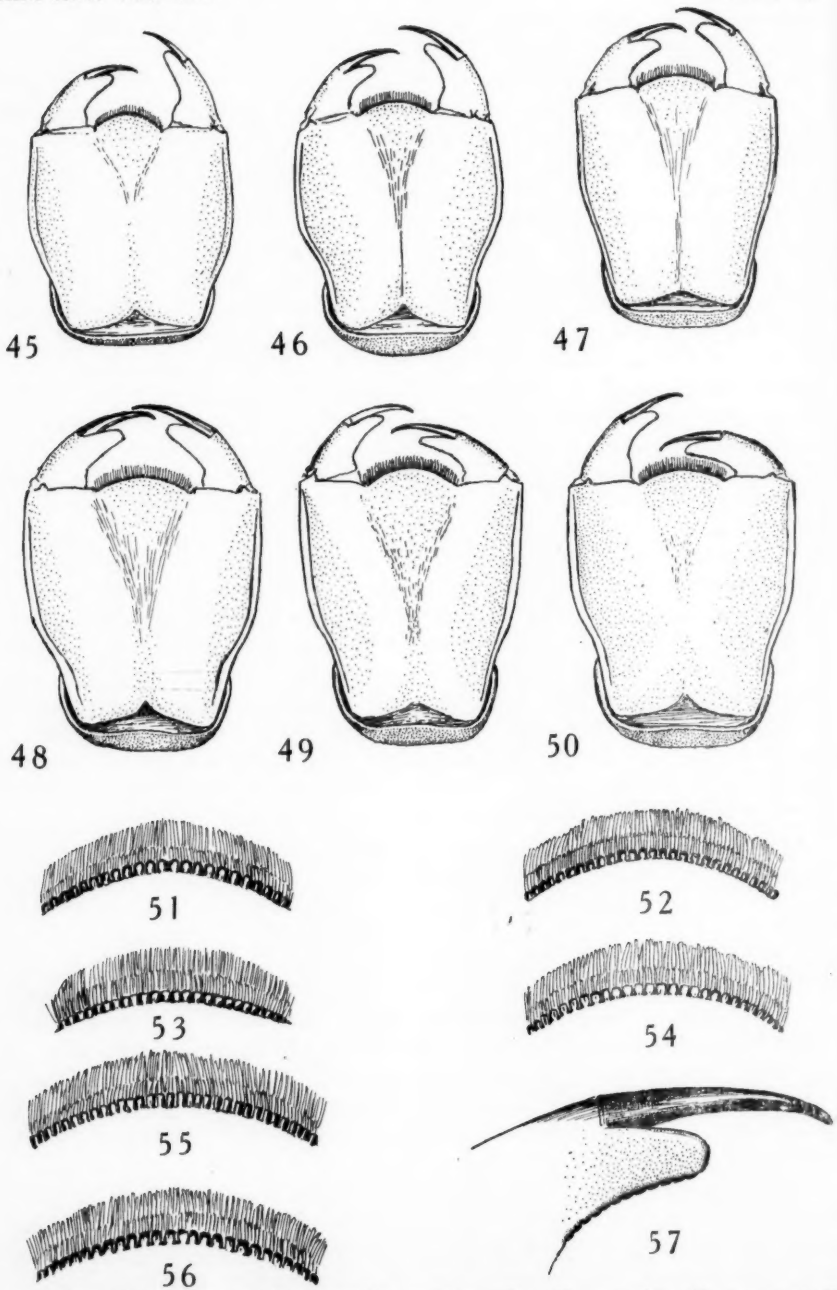
Ophiogomphus rupinsulensis (Walsh). Very similar to *O. carolus* but larger, with the third segment of the antennae narrower (three times as long as wide), the dorsal abdominal prominence usually better developed, the first one a little smaller at tip; the epiproct slightly broader at base and the cerci relatively a little longer. The coloration is a nearly uniform brown, ranging from pale to dark, sometimes obscurely blotched but without definite submedian and lateral spots. Cuticular granules large, strongly pigmented. Labium when folded attaining the hind margin of the prosternum, the mentum widest at distal end but expanding little, if at all, in the distal width, bearing 23-32 teeth, usually 27-29, the arch of the lobe usually somewhat flattened. Dorsal abdominal prominences variable, usually very low, but appearing on all the segments from 2 to 9; that of 2 nipple-like, not much elevated or recurved, those on 3 and 4 longer and less abruptly elevated; on the remaining segments gradually longer and lower, so that, in profile, the last three or four segments appear to be without dorsal prominences but merely somewhat arched longitudinally with a small apical projection. Viewed from above, the median, apical projection of seg. 9 appears to be obtusangulate or round-obtuse; those on segs. 7 and 8 broadly rounded. Anal pyramid rather short, the length of the epiproct being somewhat less than the median length of segs. 9-10, or the distance between the latero-basal angles of the cerci; epiproct about three-fifths as broad at base as long, only slightly acuminate distally and, in the male not very abruptly narrowed just beyond the ante-apical tubercles, which are situated at the proximal three-fifths of its length. Cerci usually about three-fourths as long as the epiproct, their width at base a little more than half the length of the dorsal margin, which is straight; ventral margin slightly concave distally. Lateral spines on 7-9, about equal in size, those of seg. 7 slightly divergent, those of 8 parallel, or barely divergent.

Measurements of three exuviae (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Credit R.	26.0	16.0	6.5	4.5	5.0
Orient Bay	27.0	17.5	7.0	4.5	5.0
Credit R.	27.5	17.5	7.0	4.5	5.0

Localities: Meadowvale, Credit River, Ont., 18 VI 1927, 1 exuv. (Walk.); Erindale, Credit River, Ont., 16 VI 1927, 2 VII 1928, 3 exuv. (Walk.); Shawanaga River, Parry Sound, Ont., 1 exuv. (P. Hahn); Pustagone River, Orient Bay, Lake Nipigon, Ont., 14 VII 1920, 10 exuv. (Walk.); Ottawa, Ill., 27 VI 1902, 1 exuv. (Cornell coll.); Little Darby Creek, Columbus, O., 7 VI 1920, 1 exuv. (Kennedy).

The specimen from Columbus, Ohio, received from Professor Kennedy and labelled *rupinsulensis* agrees with those from the Credit River, where this is the only species of the genus present. *O. rupinsulensis* was also captured on the Pustagone River, where the exuviae were found. I have therefore no doubt about the diagnosis of these exuviae as those of *rupinsulensis*, although I have never reared the species.



Figs. 45-50, labium of *Ophiogomphus* nymphs. Fig. 45, *anomalus;* 46, *aspersus;* 47, *carolus;* 48, *colubrinus;* 49, *mainensis;* 50, *rupinsulensis.* Figs. 51-56, median lobe of mentum, showing teeth: 51, *anomalus;* 52, *mainensis;* 53, *aspersus;* 54, *rupinsulensis;* 55, *carolus;* 56, *colubrinus.* Fig. 57, labial palpus of *O. anomalus,* showing teeth and terminal hook.

The specimens from the clear, somewhat peat-stained waters of the Pustagone River are darker than those from the Credit, which flows over limestone and, at the localities named above, has a considerable deposit of silt.

A nymph, doubtfully attributed to this species, was described by Needham and Hart. ('01).

Ophiogomphus severus Hagen. Resembles *occidentis* in size, coloration and the relatively broad abdomen, which gives it a robust appearance. Colour a pale yelowish brown (alcoholic) or grayish brown (exuvia), without definite markings; hairy; cuticular granules small, not deeply pigmented. Labium, when folded, attaining the hind margin of the prosternum; sides of mentum diverging distad of the contracted basal part, median lobe bearing 26-35 teeth, its arch faintly subangulate. Abdomen in exuviae somewhat more depressed and broader than in the other species (except *occidentis*), the greatest width equal to about the length of the last four segments, together with the anal pyramid. Dorsal prominences on segs. 2 and 3 moderately high, tapering and recurved. On the remaining segments they become gradually lower and more horizontal, so that, on 8 and 9 they are almost straight in profile with acute projecting apices. Viewed from above, the apices of the prominences on 8 and 9 project over the following intersegmental spaces and appear acute or rectangulate. Lateral spines on abd. segs. 7-9, about equally developed, slightly divergent on 7; lateral margins heavily fringed with long hairs. Anal pyramid slightly shorter than in *occidentis. colubrinus* and *aspersus,* but very nearly as long as segs. 9-10; epiproct somewhat acuminate, its basal width equal to about four-sevenths of its length. Cerci about four-fifths as long as epiproct, their basal width less than half the length of their dorsal margin, tapering to slender-pointed apices.

Measurements of three specimens (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Satus Crk.	25.5	17.0	8.0	5.0	6.0
Satus Crk.	27.0	17.5	7.5	5.0	6.0
Satus Crk.	27.5	19.0	8.0	5.0	6.0

Localities: Jasper Park, Alberta, 20 VIII 1926, 1 juv. (Univ. of Manitoba coll.); Satus Creek, Yakima Valley, Wash., 29 VI 1917, 5 exuv. (Kennedy); Silver springs, Idaho, 1 full grown nymph (H. Harvey, Cornell Univ. coll.); Provo, Utah 1 full grown nymph (Cornell Univ. coll.); Bean River, near Amalga, Utah, 30 VI 1926, 1 exuv. (Cornell Univ. coll.)

The nymph of *O. severus* was first described by Hagen ('85) and further defined and figured by Kennedy ('15 and '17).

Ophiogomphus colubrinus (Selys). Of medium to large size, pale to moderately dark brown (exuv.), nearly uniform, or only obscurely blotched, not especially hairy; cuticular granules fine, more or less darker than the ground colour. Labium, when folded, attaining the hind margin of the prosternum; mentum contracted in the basal third, beyond which the sides are just preceptibly divergent, the greatest width being at the distal end; median lobe evenly arcuate, a little more than one-third as broad as the mentum; with 23-27 teeth. Dorsal prominences well developed on all the segments (2-9), rather abruptly elevated, decreasing but little in height caudad but increasing in length, the apices chang-

ing from a perpendicular to a horizontal position, the prominence on seg. 2 being erect and slender, those on 8 and 9 arcuate in profile wtih projecting apices, which, if viewed from above, are angulate and, in the case of 9, usually acute. Lateral spines on 7-9, of nearly equal size, and separated somewhat widely from the intersegmental constrictions, those of 7 parallel or faintly divergent, the others slightly convergent. Anal pyramid as long as segs 9-10 or barely longer; epiproct somewhat acuminate, its length about twice the basal width and about equal to the distance between the latero-basal angles of the cerci, as seen from above; the ante-apical tubercles of the male at about two-thirds or five-eighths of the length from base. Cerci about three-fourths as long as epiproct, shaped as in *severus*.

Measurements of three exuviae (milimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Godbout	26.0	16.0	6.5	4.75	5.50
Blind R.	26.7	17.0	7.0	4.70	5.75
Nipigon	29.5	20.0	7.5	5.00	6.00

Localities: Nipigon River, at Nipigon, 28 VIII 1907 4 exuv. (Walk.); Bear River, Lake Nipigon, Ont., 17 VI 1921, 3 exuv. (Clemens); Mattagami River, 20 VIII 1931, 2 exuv. (Harkness); Blind River, Ont., 9 exuv. (P. Hahn); Killarney, Parry Sound, Ont., 1 full grown nymph (A. D. Robertson); Portage du Fort, Ottawa, River, Ont., 29 VIII 1932, 5 exuv. (Ide); Godbout, Que., 26 VII 1918, 5 exuv. (Walk.)

I have not reared this species, but the common occurrences of the exuviae in northern localities where the adults are found and the association of adults and exuviae on the Nipigon, Mattagami and Godbout Rivers indicate clearly enough, in the absence of any other known species of the genus, that the nymph is correctly assigned to *O. colubrinus*. The nymph of this species was originally described by Hagen ('85).

Ophiogomphus aspersus Morse. Very similar to *O. colubrinus* but averaging a little smaller, with somewhat lower dorsal prominences and smaller lateral spines on seg. 9. Very hairy, with moderate to fine cuticula granules; coloration pale brownish, nearly uniform or obscurely blotched, with no definite submedian or dorso-lateral spots on the abdomen. Third segment of antenna spatulate, three times as long as broad. Labium attaining hind margin of prosternum, sides of mentum beyond the basal constriction slightly curved convexly, the width at the distal end being usually slightly less than the middle width; middle lobe moderately and evenly arched, its width equal to one-third that of the distal width of the mentum, the teeth numbering 25 to 28. Dorsal prominences variable, like those of *colubrinus* but lower; that of seg. 2 erect, moderately high, with a small apex; those of the remaining segments gradually lower, that of 9 sometimes almost straight and horizontal, usually slightly arcuate, the apices on 8 and 9 appearing in dorsal view obtusangulate. Lateral spines smaller on seg. 9 than on 7 and 8, sometimes largest on 7. Anal pyramid as long as segs. 9-10 or slightly longer, the epiproct acuminate, very slender apically; ante-apical tubercles of male at about mid-length. Cerci as in *severus*, averaging a little narrower at base than in *colubrinus*.

Measurements of three exuviae (millimeters):

Locality	Total length	Length of abdomen	Width of abdomen	Length of h. femur	Length of h. wing
Covey Hill	26.0	16.5	7.0	4.5	5.0
Saranac Inn	25.0	16.0	7.0	4.5	5.0
Saranac Inn	28.0	17.5	7.0	4.5	5.3

Localities: Covey Hill, Que., 17 VII 1927, 4 exuv., (Walk.): Saranac Inn, N. Y., VI 1900, 2 exuv., 3 nymphs (2 penult., 1 juv.) (Needham, Cornell Univ. coll.); Walnut Creek, Mich., 1 VII 1906, 1 exuv. (Cornell Univ. coll.).

The nymph of this species was first described by Needham ('01).

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NEW COLEOPTERA XVI

BY H. C. FALL,

Tyngsboro, Mass.

Limonius knulli n. sp.

Length 5.7 to 6.1 mm., width 1.65 to 1.75 mm. Form narrow, parallel, color piceous bronzed, base of antennae, prosternal lobe and legs reddish, surface moderately shining, distinctly pale pubescent.

In size, form, color and all other details except as mentioned below, this species is so similar to the common *quercinus* as to be practically indistinguishable to the casual eye. In it the clypeal margin is arcuato-truncate with at most a very feeble or barely discernable median sinuation; the pronotal punctures are distinctly umbilicate at sides and the propleura are very coarsely umbilicate punctate throughout. In *quercinus* the clypeal margin is rather deeply sinuate, and the pronotal and propleural punctures are simply perforate.

Eight examples of this species are before me; the type and one paratype from Forksville, Pa., collected July 17, 1930, by Mr. J. N. Knull; Laporte, Pa.; Bathurst, New Brunswick; Meddybumps, Maine; Banff, Alberta (Fenyes 3). The Banff specimens I thought at first might be something else, but careful

attention convinces me that they are not specifically different from those from the eastern localities mentioned.

This species is dedicated with pleasure to Mr. Knull, who first detected it and to whom I am indebted for the type and one paratype. Three paratypes are returned to Mr. Knull.

Melasis rufipalpis Chev.

I have recently received from Mr. D. K. Duncan of Globe, Arizona, a specimen of *Melasis* taken by himself in the Sierra Ancha Mts., Gila Co., of that state. It agrees so completely with the description of the Mexican *rufipalpis* of Chevrolat that I have no doubt of the correctness of the reference.

M. rufipalpis may be at once known by its black antennae, these organs being reddish brown in all three of our previously known species.

In Mr. Geo. R. Hopping's table (Can. Ent. 1926, p. 225) *rufipalpis* would place between *rufipennis* and *tsugae*. It has the transverse frontal carina of *rufipennis,* though in less developed degree, while in superficial aspect it more nearly resembles *tsugae,* but quite lacks the tumescent frontal areas of the latter species. The color is black throughout except palpi and tarsi; thorax scarcely at all narrowed posteriorly; elytra tapering and striate as usual, the pubescence blackish, very short, semi-erect and scarcely visible except in profile. In my single example the scutellum is distinctly narrowly longitudinally grooved.

Colaspidea pallipes n. sp.

Of the usual robust convex form characteristic of the genus. Color rather brilliant green, legs rufous with trace of greenish metallic tint at the knees; antennae pale basally becoming more or less piceous externally; pubescence yellowish cinereous, plentiful, rather long, subrecumbent.

Head densely punctate. Prothorax one-half wider than long and seven-tenths as wide as the elytra across the humeri; sides as viewed from above broadly arcuate and subparallel, a little convergent in front, hind angles minutely prominent, surface very densely evenly punctate.

Elytra about two-fifths longer than wide, sides parallel in basal two-thirds, not at all inflated posteriorly in the female; slightly more finely and evidently less densely punctured basally than the thorax, the punctures distant by about their own diameters. Body beneath very densely punctured.

Length 4 to 5 mm.; width 2.1 to 2.8 mm.

Described from a series of seven examples taken by the writer on Pinon pines (*P. monophylla*) at an altitude of 6000 ft. in the San Bernardino Mts., Southern California, July 3, 1917. The type is a female.

By its bright rufous legs this species is separable at once from all our other known species, except possibly *subvittata,* which though having the legs of a somewhat duller rufous shade is otherwise very different in appearance. The ventral segments in *pallipes* are distinctly rugose from the density of the punctuation, an extreme not very closely approached in any of the remaining species of the genus.

Colaspidea grata n. sp.

Of the usual robust form; size large, color green, coppery green or dark blue; femora dark, tibiae rufous, tarsi brown; pubescence moderately long, pale yellowish cinereous, subrecumbent.

Prothorax strongly transverse, sides subevenly not very strongly rounded, feebly or scarcely sinuate posteriorly, the hind angles not prominent; punctuation quite dense, the punctures closer and slightly but perceptibly larger than on the adjacent parts of the elytra.

Elytra about one-third wider than the thorax and two-fifths longer than wide, parallel sided in basal two-thirds, not at all inflated posteriorly in the female; punctures at base distant by their own diameters or rather more, becoming finer and sparser apically. Body beneath moderately densely punctate.

Length 4.1 to 5.2 mm.; width 2.3 to 2.9 mm.

Southern California: San Bernardino Mts., 4000-5000 ft., July 9-12, 1892; occurrying on yellow pines (*P. ponderosa*). Described from four examples (1 ♂, 3 ♀ s). The type is a green female bearing date 7-12-92.

The above specimens were for a time placed with others which in my Southern California List (Occ. Pap., Cal. Ac. Sci. VIII, 1901) I referred to *C. smaragdula* as being most nearly in accord with the latter as characterized in Horn's table (Trans. Am. Ent. Soc. XIX, p. 204). Although bearing the same general locality and date I cannot now be sure that these other specimens were actually taken under the same conditions as those of *grata*, nor can I be sure that they are correctly referred to *smaragdula*, though they possess several features characteristic of that species. These features are the almost entirely dark legs, the whiter pubescence, the more strongly rounded sides of the thorax with the point of maximum width at about the basal third (nearer the middle in *grata*) and with more pronounced subbasal sinuation and more prominent hind angles. The females also have the elytra perceptibly widened or inflated posteriorly, not so in *grata*.

Smaragdula was described from Sacramento, Cal., and the length is stated as .15 inch (3.75 mm.). The species is distinctly smaller than the two above described and like *cuprascens* and *varicolor*, which also inhabit comparatively low altitudes, is clothed with a shorter, sparser and more bristling pubescence than is the case in *pallipes* and *grata* of the higher altitudes. Species of the varicolor complex are abundant in the sage brush areas of the lowlands and foothills of Southern California and I have examples collected by Mr. Van Duzee at Bradley, Monterey Co., which are definitely labelled as occurring on sage. The numerous variants of *varicolor* or that now pass as such, form an extremely puzzling problem which can hardly be solved without extensive biological data. At present it is difficult enough to decide whether certain of these should be referred to *varicolor* or to *smaragdula*.

Colaspidea pomonae n. sp.

In the foothills of the Sierra Madre Mts. above Pomona, California, there occurs a form to which with some hesitation I give the above name. It places between *varicolor* and *cuprascens* and is most nearly allied to the latter, of which it may be only a local variety or race. It is represented in my collection by eight examples, showing no great disparity in size and agreeing closely in all other characters except color, which is very variable. Their outstanding characteristics are two: (1) the very short sparse and suberect pubescence, which feature is shared by *cuprascens*, and (2) the relatively sparse punctuation of the thorax, which I have seen duplicated only in certain individuals of *cuprascens*.

The size is about that of the smallest specimens of *cuprascens*. The color may be green, blue, green with coppery or golden thorax, blue with green thorax, violaceous or almost black; there are no bronzed or cupreous specimens. In *cuprascens* in my experience the color is limited to green or cupreous or a blending of these tints. The femora are entirely dark and the tibiae more or less rufous in both species. In *pomonae* the sides of the thorax are a little more rounded than in *cuprascens* but less strongly so than in *varicolor*, the hind angles not prominent. The length ranges from 3.5 to 4.3 mm., the width from 2 to 2.4 mm. The type is a male, blue with green thorax, the elytral suture violaceous; it bears date May 11, 1892.

The following table is devised to include the new species above described.

Pubescence long, appressed; elytra with more or less evident narrow smooth vittae in well preserved specimens; color piceous with green bronze luster, legs dark rufous. (Santa Catalina and San Clemente Islands)..... ..... *subvittata* Fall.

Pubescence moderately long, recumbent, ochraceo-cinereous; sides of thorax not strongly rounded, the hind angles not or scarcely prominent.

Bright green, legs red. (San Bernardino Mts.).....*pallipes* n. sp

Green, coppery green or blue, femora dark, tibiae in great part and tarsi brownish red. (San Bernardino Mts.).....*grata* n. sp.

Pubescence sparser, shorter and more bristling, whitish; sides of thorax strongly rounded posteriorly and sinuate before the prominent hind angles.

Legs entirely dark or with the tibae obscurely rufescent apically; dark blue or violet varying to greenish.....*smaragdula* Lec.

Legs with rufous tibiae and typically with the base of femora of same color; color blue, green, or bronze, size small.....*varicolor* Crotch.

Pubescence very short, sparse and suberect; sides of thorax moderately or broadly medially rounded, hind angles not prominent; femora dark metallic, not rufous at base, tibiae more or less rufous.

Sides of thorax moderately rounded; color blue, green, violaceous or nearly black .....*pomonae* n. sp.

Sides of thorax broadly rounded, color green or cupreous....*cuprascens* Lec.

The *Colaspodea insularis* of Blatchley, erroneously, included in the Leng Supplement as from Florida, is from the Isle of Pines south of the western end of Cuba, and therefore is not a member of our fauna. It is very small (2.7 to 3 mm.) and differs notably from any of the Californian species, in that the sides of the thorax are continuously divergent from apex to base, the front angles scarcely produced, and the vestiture consisting of scale-like hairs.

Psylliodes verisimilis n. sp.

Of the usual elongate oval form and more or less similar in color to *elegans* Horn. In the type the head and thorax are black with only the faintest trace of metallic reflection, the elytra with very dark bluish green surface luster. In a second example the thorax is distinctly bronzed, the elytra more evidently dark green. The antennae at base and tibiae and tarsi are more or less paler as usual. Prothorax transverse, sides nearly straight and strongly convergent to the post-apical angulation, surface finely not closely punctate, with traces of very fine alutaceous sculpture especially antero-laterally. Elytral striae scarcely impressed

the strial punctures finer than in any other of our species except *sublaevis;* interstitial punctures evident through fine, and to a considerable extent serial in arrangement.

The last ventral of the male is polished and finely sparsely punctate, the disk flattened and somewhat obliquely declivous from near the base, the apex broadly truncate, the truncature a little prominent at middle.

Length 2.9 mm.; width 1.5 mm.

Described from two males from Cloudcroft, New Mexico, the type bearing date June 9-12, the paratype with date VI-17-02.

As indicated above this species resembles *elegans* in color, but the basal protarsal joint is not so widely dilated as in the latter and the strial punctures of the elytra are much finer. The fine strial punctures are as in *sublaevis,* and the last ventral is somewhat like that of the latter but the color is different and the interstitial punctures more evident than in *sublaevis.*

Psyllicdes credens n. sp.

Above of a dark coppery bronze color, the base of the antennae, tibiae and tarsi paler. The form and punctuation throughout is substantially as in *convexior* with the exception of the prothorax, which when viewed from the proper angle—preferably from the front and obliquely from above—is seen to be less narrowed anteriorly than in any other of our species. The basal joint of the fore tarsus in the male is perceptibly dilated but less strongly so than in *convexior,* in which also the form of the joint is more oval (less triangular) than in the present species. The last ventral of the male is normally convex, rather broadly rounded behind, the surface moderately punctate.

Length 2.7 to 2.9 mm.; width 1.4 to 1.5 mm.

Described from three male specimens taken at Bishop, California, June, by Dr. A. Fenyes, and kindly presented to me by Mr. C. A. Frost.

For convenience of reference Horn's table (Trans. Am. Ent. Soc. 1899, p. 310) somewhat modified and amplified to include the two specimens above described, is here presented.

KEY TO THE KNOWN N. AM. SPECIES OF PSYLLIODES

Basal joint of protarsus of male strongly dilated in suboval or oval triangular form.
  Last ventral of male broadly impressed.....*punctulata* Melsh.
  Last ventral of male convex nearly as in the female.
    Above uniform in color, dark bronze.....*convexior* Lec.
    Above bicolored, prothorax black bronzed, elytra blue green..*elegans* Horn.
Basal joint of protarsus of male only moderately dilated and more triangular in form.
  Elytra with distinct interstitial punctures.
    Sides of thorax quite strongly anteriorly convergent; last ventral of male with disk flattened and feebly declivous in apical three-fourths, the apex widely subtruncate, the truncature a little more prominent medially; elytra dark green or greenish black, thorax black or bronzed.....
    .....*verisimilis* n. sp.
    Sides of thorax but little convergent, last ventral of male normally convex, broadly rounded at apex; color above uniformly dark bronze.
    .....*credens* n. sp.

Elytral interstitial punctures few and very fine, scarcely visible under moderate amplification; last ventral of male polished and impunctate, surface declivous posteriorly, last ventral of female normally convex but shining and with few punctures.....*sublaevis* Horn.

The general use in the table of the male secondary sexual characters is in some degree unfortunate since it requires the presence of males for definite determination. With the aid of the locality label however females may usually be placed with moderate success by attention to color (*elegans* and *verisimilis*), the near obliteration of the interstitial punctures of the elytra (*sublaevis*), the relatively feebly oblique sides of the prothorax (*credens*), the generally smaller size, narrower form and coarser serial punctures of the elytra (*punctulata*), and the absence of these special marks of distinction in *convexior*. Horn's statement that the elytral intervals are more numerously punctulate in *elegans* than in any other of our species is not obvious in my series, nor are size convexity and general outline sufficiently definite or constant to be always reliable. I have noticed that the thorax in *punctulata* is perceptibly less narrowed in front than is the rule in *convexior*, a character not mentioned by Horn, and one which may be of some service in distinguishing the females of these two closely allied species.

A NEW BEE OF THE GENUS PERDITA FROM COLORADO.

BY T. D. A. COCKERELL.

Boulder, Colorado.

Perdita subtristis n. sp.

♀ (*Type*). Length about 4 mm.; head broad and short, with very wide face; clypeus and labrium entirely black, as also supraclypeal area; lateral face-marks present, pale yellow, long and very narrow, a little broadened below. The upper end, on orbit, a little above level of antennae; mandibles yellowish-white with the apical part broadly ferruginous; scape slender, yellow in front; flagellum thick black, the under side pale yellowish; front and vertex shining, dark olive green; thorax shining dark green, the mesothorax and scutellum very brilliant, mesothorax with thin erect white hair; tubercles, a slender line along sides of mesothorax above base of wings, and a short stripe at each side on upper border of prothorax, all pale yellow; wings clear hyaline, nervures practically colorless; stigma large, hyaline, with a dusky border; hind legs black, except that the femora are yellow beneath; middle legs with the femora broadly yellow at apex and the tibiae yellow in front; front legs similarly colored, the tibiae very broadly pale yellow; anterior and middle basitarsi pale yellow and the small joints reddish, but hind tarsi black; abdomen shining, dorsally dark, slightly brownish, the first tergite with only a very small yellow mark at each side; tergites 2 to 4 with successively broader pale yellow bands, having a linear interruption in middle; fifth tergite broadly yellowish on each side; apical plate pale reddish; venter light yellow.

♂ The male found on the willow at the same time and place appears to be *P. salicis* Ckll. It has the face entirely light yellow below level of antennae and the lateral marks broad; sides of thorax mainly yellow; anterior and middle legs pale yellow; hind legs with the femora black above at apex, and the tibiae

black behind; abdomen with five rather narrow yellow bands, all narrowly interrupted in middle.

Colorado: Salida, June 19, at flowers of *Salix* (Cockerell). In my tables of *Perdita* the female runs to *P. mentzeliae* Ckll. which is quite different by the broad lateral face-marks and broad white abdominal bands. *P. punctifera* Ckll. and *P. subfasciata* Ckll., which run to the same vicinity in the table are also quite different. The male runs straight to *P. salicis*, except that the abdomen has five bands. Compared with a specimen, it differs by the much greater amount of yellow on lower part of cheeks, and the flagellum beneath clear yellow instead of pale reddish. My present opinion is that the male is to be referred to *P. salicis*, while the female, which is very unlike *P. salicis*, is evidently distinct. Yet they do show points of similarity, and Timberlake has found that in California there are three distinct races of *P. salicis*, easily separated in the female, but exactly alike in the male sex. The female *P. subtristis* is quite different from *P. salicis coloradana* Timb., from Delta, Colorado. Timberlake suggests that the *P. salicis* collected by Rohwer at Rifle, Colo., and recorded by me is his *P. salicis coloradana*. This I find to be the case.

At Salida and at Swissdale (Freemont County), in June *Perdita zebrata* Cresson occurred; the form with yellowish-white face-marks. At Salida it was visiting *Peritoma serrulatum*, but at Swissvale a stray male was found on *Pentstemon*. The only other panurgid taken at Salida was a male *Panurginus picipes* (Cresson), June 20 (*Chas. Wagner*). This species was described from Texas.

SOME NEW STONEFLIES FROM WESTERN CANADA

BY FERRIS NEAVE,
University of Manitoba.

In collections made by the writer during the last few years the following new forms have appeared, the types of which are in his collection.

Isoperla fumosa sp. nov.

Adult. Head brown, yellow around eyes and bases of antennae, a yellow spot in the ocellar triangle and another in front of the anterior ocellus; antennae and palpi brownish. Prothorax with angles somewhat rounded, brown with darker rugosities on either side of the broad central yellow stripe. The latter has a narrow brown central line. Wing veins brown. Legs brown. Abdomen brown with a little pale colour at the base and a pair of dorsal yellow dots on most of the segments. These dots are sometimes nearly obscured. Cerci dark brown at base, paler beyond.

Subgenital plate of female produced in the middle and truncate behind (fig. 1).

Eighth ventral sternite of male bearing a knob which is nearly always wider than long (fig. 2). Subanal lobes recurved over tenth tergite and bluntly pointed.

Length (to tip of wings), male 11 mm.-13 mm.; female 14 mm.

Holotype: Female, Pigeon River, Man., 4.vi.32, F. Neave.

Allotype: Male, same place and date.

CAN. ENT. VOL. LXV. PLATE 15

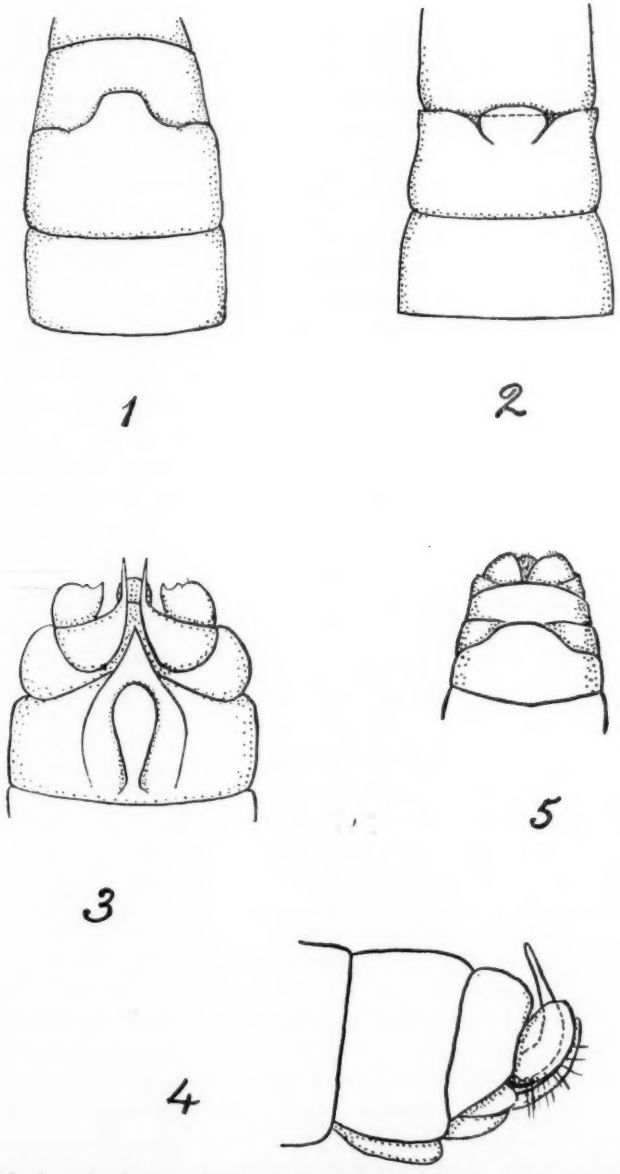

Fig. 1—*Isoperla fumosa*, female, subgenital plate. Fig. 2—*Isoperla fumosa*, male, ventral knob. Fig. 3—*Neumoura cataractae*, male, end of abdomen, ventral view. Fig. 4—*Neumoura cataractae*, male, end of abdomen, lateral view. Fig. 5—*Neumoura columbiana*, female, end of abdomen, ventral view.

Paratypes: Pigeon River, v. and vi.32; Manigotagan River, 3.vi.29; Warren's Landing, Lake Winnipeg, 1.viii.29 (A. Bajkov); George Island, Lake Winnipeg, 27-29.vi.30.

Nymph. Head coloured much as in adult,—brown with a yellow spot in the ocellar triangle, another in front, yellow areas near eyes, at bases of antennae and across front of clypeus. Antennae pale brown. Abdomen bearing three brown stripes. Cerci pale brown. Length 10 mm.

In most of the localities given this species occurred in company with *I. bilineata* Say, from which the adults may be distinguished by the much darker coloration of head and body and by the genital characters. The latter will also serve to separate the species from *I. signata* Banks, which, moreover, has a characteristically banded nymph (see Claassen, Plecoptera Nymphs of North America, p. 75). My nymphal material of *I fumosa* is very limited and I am unable as yet to give any good characters for separating this phase from *I. bilineata*.

Acroneuria perbranchiata sp. nov.

Adult. Head yellow with a dark brown spot covering the ocellar triangle; the yellow M-line surrounded by brown; a varying amount of brownish colour behind the eyes. Antennae almost black except at the base. Prothorax slightly narrowed behind, brownish with darker rugosities and bearing a narrow median dark brown stripe. Abdomen pale brown. Cerci brown.

Genital hooks of male flattened, pointed, yellow in colour, brown at extreme tips. The usual oval "hammer" is present on the ninth sternite.

Female subgenital plate somewhat produced and usually slightly emarginate.

Length to tip of wings, male 18 mm.-27 mm; female 25 mm.-31 mm.

Holotype: Male, Pigeon River, Man., 12.vi.32, F. Neave.

Allotype: Female, same place and date.

Paratypes: Eight males and females from the following localities: Pigeon River, 11-14.vi.32; Whiteway Point, Lake Winnipeg, 25.vii. and 7.viii.28; George Island, Lake Winnipeg, 10.viii.28. A female from Winnipeg, Man., vii-viii.09 (J. B. Wallis coll.) almost certainly belongs to this species, though its pinned and dried condition does not permit the characteristic gill tufts to be seen.

Very closely resembles *A. lycorias* Newman, from which it differs in the somewhat darker coloration, particularly manifested on the antennae, and in the presence of the prothoracic median dark stripe. A better character is the presence of anal gill tufts which can be found in a shrivelled condition attached to the subanal plates.

Nymph. Labrum dark, clypeus yellow. Frons dark brown or black with broad yellow transverse band in front of the ocelli. Occiput yellow with a little brown behind the eyes and along the posterior margin. Occipital ridge absent. Antennae yellow. Legs pale, femora with a dark mark at base and another near distal extremity. Abdominal segments yellow with black bands on their posterior margins. Some less conspicuous dark colour often present also on anterior margins of first few segments. In addition to the thoracic gills a pair of anal gill tufts is present. Except for this character the nymph almost exactly resembles *A. lycorias*, to which it is evidently closely related. The brown colour on the frons usually does not extend forward on either side of the anterior ocellus. Conse-

quently the transverse yellow band, which in *A. lycorias* is M-shaped, is broader and nearly straight in the present species.

I have nymphal skins of *A. perbranchiata* from Pigeon River, Wanipigow River and Manigotagan River, all eastern tributaries of Lake Winnipeg, and a large nymph from Fay River, Man., eighty miles north of The Pas.

Nemoura cataractae sp. nov.

Adult. Brown, prothorax narrower than head, narrowed behind. Antennae pale. Two bunches of gills, each of four or five filaments, on the neck. Legs pale with black marks at the joints. Wings without bands. In forewing vein R not bent up at origin of Rs. Ventral lobe rounded at tip, about two and a half times as long as wide. Cerci membranous with a tooth on the posterior inner side. Supra anal process chitinized, narrow and tapering, recurved over end of abdomen. Each subanal lobe produced on its median side into a long, narrow upcurved process (figs. 3 and 4). Length to tip of wings (male) 8 mm.

Holotype: Male, Cataract Brook, Lake O'Hara, B. C., 14-17.v.32, F. Neave. Female unknown.

Nemoura columbiana Claassen

This species was described from a single male.

Female. Coloration of body, wings and legs as in male. The seventh abdominal sternite is produced into a rounded plate which extends across the eighth sternite (fig. 5). Length 8 mm.-10 mm.

This species is evidently widely distributed in the Canadian mountains. I have a male and female taken on Mt. Redtop, Toby Valley, Purcell Range, B. C., 10 and 11.vii.29, altitude 6500 and 9000 ft. Both sexes were abundant at Cataract Brook, Lake O'Hara, B. C., 14-17.v.32, crawling over the deep snow.

A NEW MEXICAN COPRIS (SCARAB., COLEOP.)

BY LAWRENCE W. SAYLOR,
Berkeley, California.

Copris hintoni n. sp.

Holotype male. Piceous, shining, form of *arizonensis* but slightly smaller. Clypeus narrowly emarginate and notched at centre of apex, head in front and on sides coarsely punctate; smooth behind, genae acute, prominent, coarsely and rather densely punctate; frontal horn long, arcuate, surface deeply pitted on sides and rear, front smooth. Thorax with a median protuberance triangularly emarginate at apex, the angles rounded and convergently apically; surface of protuberance slightly flattened, with distinct longitudinal impression, very coarsely and rather sparsely punctured at the centre; at each side near side margin a horn-like projection, the surface between these and the median protuberance deeply excavated and coarsely but rather sparsely punctate; between the usual short carina near the side margin and the horn-like projection is at about the middle a shallow fovea which is very coarsely punctured, surface of thorax coarsely punctate at margins, near front angles, and as noted above, the disc very finely and sparsely punctured; front angles obtusely subangulate, lateral margin near the front angles not sinuate, hind angles broadly rounded; fore part of thorax not tuberculate. Elytral striae impressed, coarsely transversely punctate, the punctures very close at base and somewhat sparser apically;

intervals very slightly convex, densely irregularly and very finely punctured. Hind femora very finely and sparsely punctured at base, punctures dense and much larger apically, each puncture bearing a very fine short hair (visible only in well preserved specimens).

Male minor. Horn shorter, front half of thorax very densely and very coarsely punctured, median protuberance almost obsolete, the two apical angles of the protuberance represented by two broadly rounded elevations, the horn-like lateral projections replaced by small elevations, the front thoracic angles obtusely angulate or even slightly rounded.

Female allotype. Clypeus narrowly notched at centre of apex, frontal horn short, dilated at apex and feebly emarginate, the emargination punctured, the median thoracic protuberance broadly rounded in front, with a slight median impression at apex, the projections on each side much smaller and in the form of a conical tubercle, the anterior half of the surface very densely rugosely punctate, basal part of disc almost impunctate; middle of base with a distinct longitudinal sulcus running one-half the distance forward. Length 14 mm. to 18.5 mm. Width 7 mm. to 9.5 mm.

All specimens are from Real de Ariba, Mexico, D. F., and were collected in 1931 by Mr. H. E. Hinton at 6300 ft. elevation. Types will be deposited in the collection of the California Academy of Sciences in San Francisco. Designated paratypes will be deposited in the collections of the U. S. Museum, Mr. A. Boucomont, Mr. W. J. Brown, Mr. Howard E. Hinton and of the author.

C. hintoni is allied to *C. klugi*, which differs by its much larger size, fore angles of the thorax rounded, front face of the thoracic lobe granular and hind femora finely and very sparsely punctate. From *arizonica*, *hintoni* differs by its thoracic puncturation, the non-divergent angles of the thoracic protuberance and the different type of puncturation of the hind femora.

I wish to take this opportunity to thank Dr. E. A. Chapin of the U. S. Museum for his assistance and for the loan of several species of *Copris*. I also wish to thank Mr. A. Boucomont for examining specimens of C. *hintoni*.

A NEW BARK BEETLE FROM SOUTHERN CALIFORNIA

BY C. R. BRUCK,

Berkeley, California.

While studying some material sent to me from the southern part of California, there came to my notice this very small species of bark beetle, which interested me greatly. While it is not of much economic importance, as are other members of the subfamily *Hylesininae*, it is of interest because of its host relationship to *Chaetophloeus hystrix* (Lec.). Both occur on *Rhus integrifolia*.

This is a new species and a description of the same follows.

Renocis penicillatus n. sp.

Length 1-1.5 mm. Front of male very deeply concave, concavity fringed with very long hairs, vestiture in the concavity is sparser, shorter, and finer; frontal surface has few moderate punctures and many very fine punctures; antennal club long and slender, two and one-half times as long as wide. Pronotum is wider than long, 3.5:2, densely, moderately, granulate-punctate, very densely clothed with brown and white scale-like hairs; anterior margin straight,

fringed with two tufts of very long, setae-like hairs and with two dorsal-lateral teeth; sides strongly arcuate, narrowed anteriorly, faintly constricted behind the anterior margin, constriction more distinct on the dorsum. Elytral striae one-half as wide as the interspaces, distinctly but shallowly impressed, not as deep as wide, punctures small, widely spaced, separated by several times their own diameter; interspaces densely, closely, finely rugose-punctate, densely clothed with very short inconspicuous scale-like hairs and with a single row of widely spaced, short, upright, wide scale-like hairs; declivity steep; base very strongly elevated, surmounted by four teeth, two on each side, and with a tuft of short scale-like hairs posteriorly.

The front of the female is flat with only a faint longitudinal impression and is uniformly clothed with shorter hairs.

This species is very easily separated from *Renocis heterodoxus* Csy. by its smaller size, the tuft of long hairs on the anterior margin of the pronotum and by the more narrow, indistinct striae, and the smaller strial punctures.

The host of this species is *Rhus integrifolia*, found on the smaller branches by Mr. A. T. McClay in Peter's Canyon, Orange Co., Calif.

Through the kindness of Mr. McClay the holotype and allotype will be retained in the author's collection, one pair of paratypes will be deposited in the collection of Dr. E. C. VanDyke deposited in the California Academy of Sciences, one pair will be sent to Dr. Swaine to be deposited in the Canadian National Collection, and a designated number of paratypes will be sent to Mr. McClay and some will be retained in the author's collection.

ANNUAL MEETING—ENTOMOLOGICAL SOCIETY OF ONTARIO

The seventieth Annual Meeting of the Entomological Society of Ontario will be held at the Royal Ontario Museum, Bloor Street, Toronto, on Thursday and Friday, November 23rd and 24th, 1933.

If the programme is sufficiently full to warrant it, the meetings will be continued on Saturday, November 25th.

For the convenience of the Members and Friends of the Society, the meetings are being held during the week of the Royal Winter Fair. It is hoped that all those interested will make a special effort to be present and help maintain the high standard of our meetings.

Titles of papers should be in the hands of the Secretary or the Local Secretary by November 11th. Please advise of time required for reading and whether a lantern is needed.

Dr. W. H. Brittain, President, Macdonald College, Quebec.

R. H. Ozburn, Secretary, O. A. College, Guelph.

LOCAL COMMITTEE—TORONTO

Dr. E. M. Walker, Chairman.

Mr. F. P. Ide, Secretary, (Dept. Biology, Univ. of Toronto.)

Prof. J. R. Dymond,

Mr. W. H. Fowler.

Date of Mailing, November 1st.